



Research Reactor Infrastructure Support Capabilities



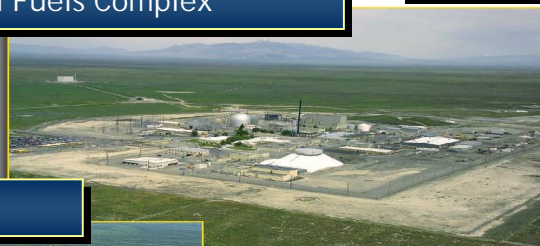
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Art Clark
Deputy Laboratory Director

June 1, 2009

INL's Main Facilities

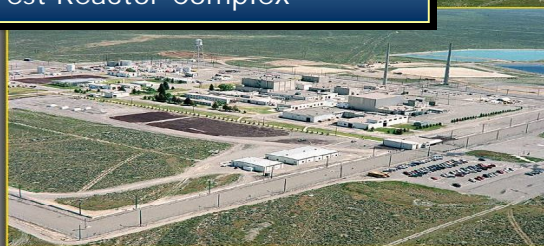
Materials and Fuels Complex



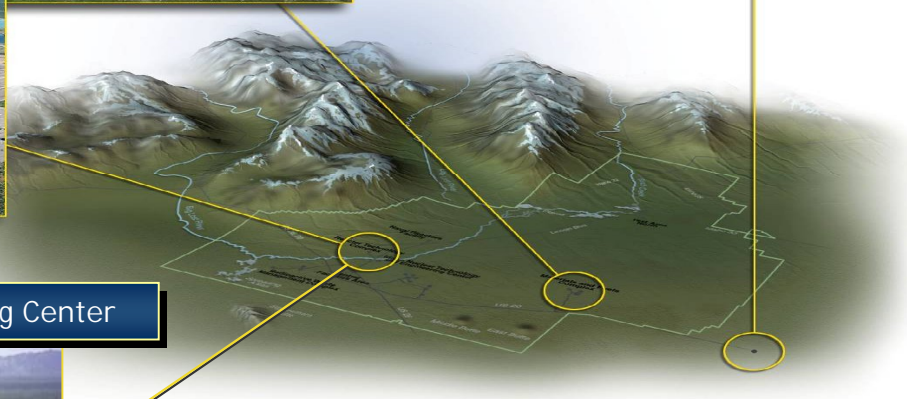
Research and Education Campus



Advanced Test Reactor Complex



Idaho Nuclear Technology & Engineering Center



Advanced Test Reactor Complex Core Functions



- Home of Advanced Test Reactor (ATR)
- ATR National Scientific User Facility
- Irradiated materials testing
- Nuclear safety research
- Radioisotope production

Advanced Test Reactor Capabilities

Reactor Type

250 MWt design
Pressurized, light-water moderated and cooled; beryllium reflector

Reactor Core

4 ft (1.22 m) (diameter and height)
40 fuel elements
9 flux traps
77 irradiation positions

Irradiation Capabilities

Pressurized water loops (currently 5, 6th being activated)
Hydraulic shuttle/rabbit
Instrumented lead experiments
Static capsule experiments

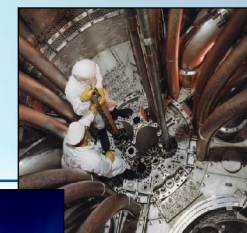


Advanced Test Reactor

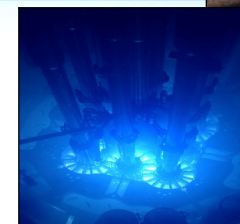


ATR NSUF: Bringing universities, industry, and national laboratories together to advance nuclear energy technology

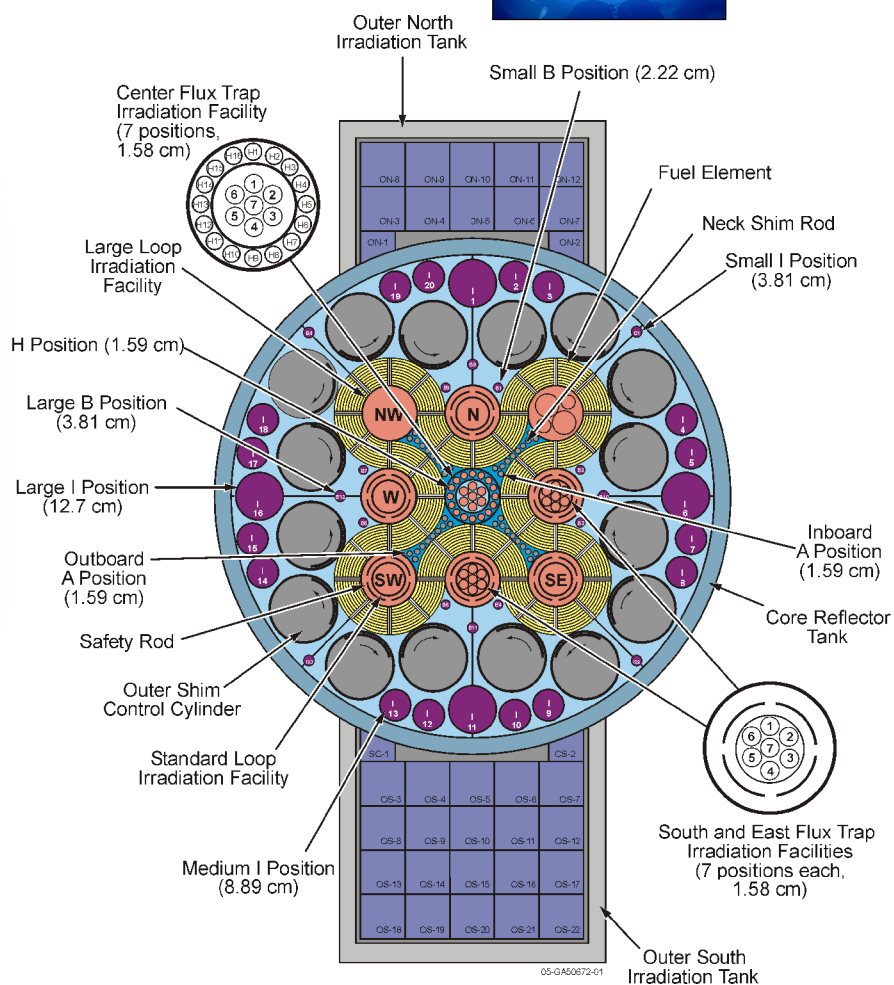
ATR Core Cross Section



Reactor Core



- Test size - up to 5.0" Dia.
- 77 Irradiation Positions:
 - 4 Flux Traps
 - 5 In-pile Tubes
 - 68 in Reflector
- Approximate Peak Flux:
 - 1×10^{15} n/cm²-sec thermal
 - 5×10^{14} n/cm²-sec fast
- Hafnium Control Drums
 - Flux/Power Adjustable Across Core
 - Maintains Axial Flux Shape



Advanced Test Reactor New Facilities

ATR Radiation Measurements Laboratory

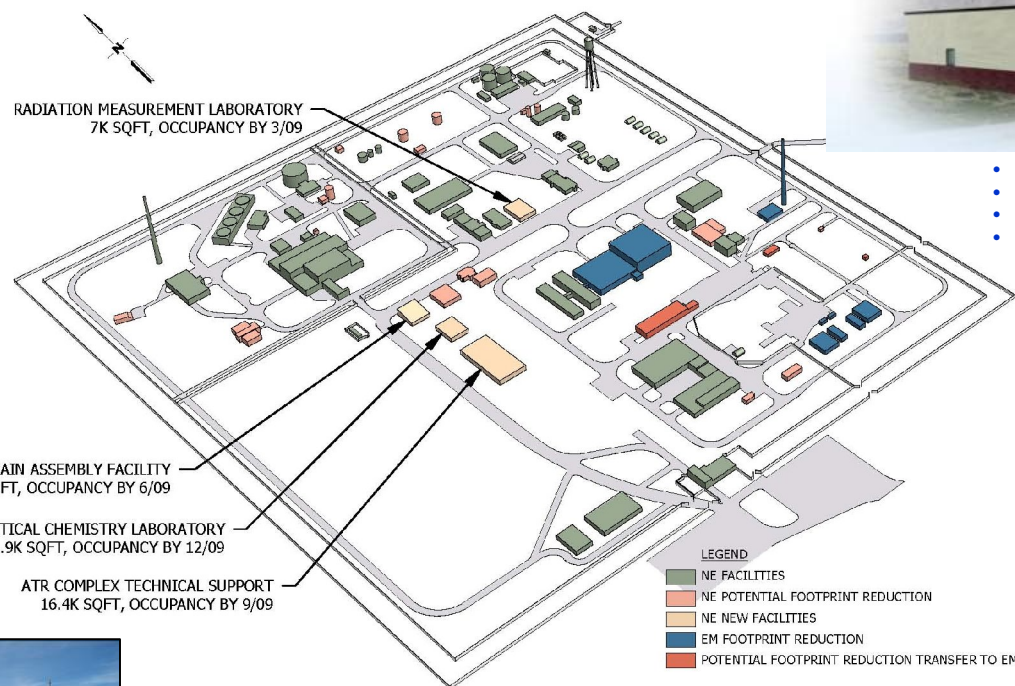


- 7K ft²
- Supports ongoing ATR programs
- Construction start July 2008
- Occupied March 2009

ATR Radioanalytical Chemistry Laboratory

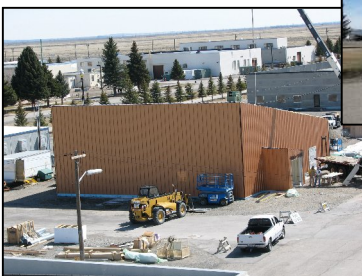


- 4.9Kft²
- Houses ATR analytical support functions
- Design began in October 2008
- Anticipated occupancy January 2010



ADVANCED TEST REACTOR COMPLEX VISION

Test Train Assembly Facility



- 4.3K ft²
- Supports collaborative research conducted in the ATR NSUF
- Includes:
 - Test train assembly area
 - Turn-around offices & conference room
 - Storage and mockup area
- Construction Start August 2008
- Scheduled occupancy June 2009

ATR Technical Support Building



- 16.4K ft²
- Supports ATR work scope
- Construction Start June 2008
- Occupancy scheduled for September 2009



Materials and Fuels Complex Core Functions



- Develop innovative solutions for nuclear power technology including nuclear fuels, separations, and fast reactor development
- Large capability hot cells for fuel studies
- Pyro-processing
- Space Battery Program

Materials and Fuels Complex Capabilities



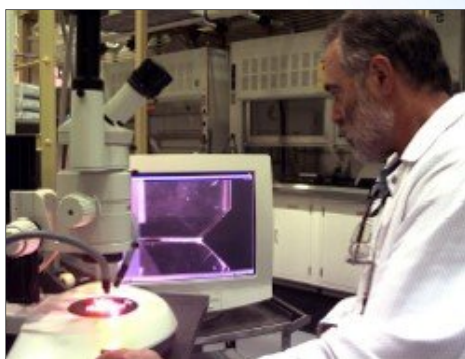
- Focused on advanced research, development, demonstration, and deployment for the nuclear fuel cycle
- Uniquely capable of supporting:
 - Nuclear Energy fuel cycle missions
 - NASA Radioisotope Power Systems (RPS)
 - National Security Nuclear fuels development and characterization
 - Recycling technologies development
 - Waste form development
 - Environmental & waste management



Neutron Radiography Reactor



Analytical Laboratory Hot Cell



Electron Microscopy Laboratory

Materials and Fuels Complex Capabilities

■ Hot Fuel Examination Facility:

- Hot-cell complex for the preparation and examination of irradiation experiments
- Wide range of remote operations and examinations performed in shielded cells



Hot Fuel Examination Facility

■ Fuel Cycle Facility:

- Provides program support to AFCI; specifically, EBR-II spent fuel treatment and pyroprocess development.
- Examines irradiated fuels and material experiments



Fuel Cycle Facility

■ Fuel & Applied Science Building

- Radiological facility that provides for the research and development of low enrichment (LEU) fuel as an alternative for research reactors, spent fuel treatment, nuclear waste research and development, and the conduct of other experimental projects.



Fuel & Applied Science Building

Materials and Fuels Complex Capabilities

■ Analytical Laboratory:

- Category III Nuclear facility
- Analysis of nuclear fuels and reactor components
- Analysis of hazardous, mixed, or highly radioactive wastes and waste forms
- Analysis of environmental samples
- Determinations of inorganic isotopic content constituents and radionuclides
- Characterization of engineered materials



Analytical Laboratory

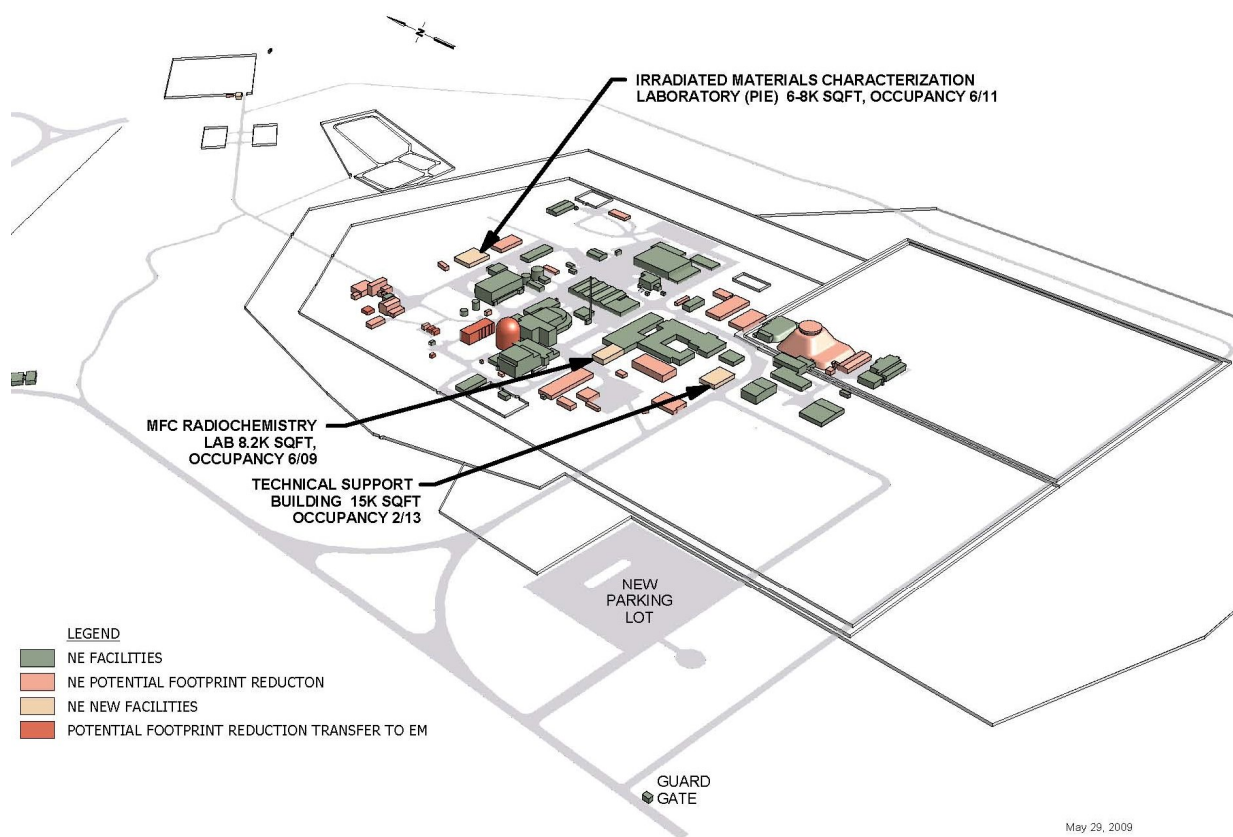
■ Fuel Manufacturing Facility:

- Storage vault and glove boxes used for fuel manufacturing and other handling and process
- New reactor fuel development work, as well as general fissionable material storage and handling and processing
- Inert atmosphere glove box train that allows fuel fabrication for the Advanced Fuel Cycle Initiative (AFCI)
- Fissionable material receipt, handling, packaging, and shipment in support of the AFCI
- General maintenance of the existing inventory of fissionable material.
- Receipt and storage of neptunium-oxide product.



Fuel Manufacturing Facility

Materials and Fuels Complex New Facilities



MATERIALS AND FUELS COMPLEX (MFC) VISION

May 29, 2009



Radiochemistry Laboratory (RCL) ~8.2K ft².

- Facilitates partnering with the nuclear power industry, other labs, universities, and international organizations.
- Includes laboratories to support key programs
 - Advanced Fuel Cycle Initiative
 - Next-Generation Nuclear Plant (NGNP)
 - Counter Proliferation Signatures
- Construction Start May 2008
- Occupancy scheduled for June 2009

Irradiated Materials Characterization Laboratory (IMCL) Proposed 6 - 8K ft²

- Post irradiation examination on ATR test samples
- Hazard Category II Nuclear facility
- Will contain small reconfigurable radiological shielded enclosures
- Will be designed using LEED criteria
- Occupancy projected for June 2011.

MFC Technical Support Building (MFC-TSB) 15K ft²

- Stand-alone facility to support MFC Complex work activities
- Will include office space, restrooms, communications, and mechanical and electrical rooms.
- Facility construction plans are still being formulated.
- Projected occupancy February of 2013.

Capability development to support fuel cycle research